PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 3190R-02	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US 03/22000	International filing date *(day/month/year)* 11.07.2003	Priority date *(day/month/year)* 12.07.2002
International Patent Classification (IPC) or both national classification and IPC C10M141/06		
Applicant THE LUBRIZOL CORPORATION et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
16.01.2004	27.10.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Kazemi, P Telephone No. +49 89 2399-8592

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US 03/22000

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-20 as originally filed

Claims, Numbers

1-14 filed with telefax on 21.07.2004

2. With regard to the **language,** all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-14
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations

see separate sheet

Concerning section V

1. The subject-matter of the application is directed to a fluid comprising a special class of friction modifiers (FM) being reaction products of selected aminoalcohols and a branched chain alkyl (≥ 6 carbons) carboxylic acid, the FM having at least two of the branched hydrocarbyl groups, and a dispersant (claims 1-10). Further embodiments are claimed concerning methods using the composition (claim 11) or the FM alone (claims 12-13), or a more generic branched chain friction modifier based on any aminoacohol in inter alia transmissions, in particular automatic transmissions (claim 14).

2. Reference is made to the following documents:

   D1: US-A-4786426
   D2: US-A-4208293
   D3: US-A-4293432
   D4: FR-A-2079970
   D5: US-A-4886612
   D6: FR-A-1462248

3. Novelty (Article 33(2) PCT)

   D1 which refers to a borated oxazoline, being the reaction product of hydrocarbyl substituted carboxylic acid (oleic acid) with tris(hydroxymethyl) amino methane (THAM) and which is used as friction reducing agent in an engine oil composition comprising inter alia a dispersant. The only use that is disclosed in D1 is for *engines*; D1 discloses a non-borated product as a comparative example (Table 1). The composition of claim 1 differs from that of D1 in that the alkyl chains of the reaction product must be *branched*. The subject-matter is thus novel over D1.

   The rest of the cited documents are more remote, they all refer to engine oils and differ from subject-matter of the independent claims 1, 11, 12 and 14 as follows:

   D2 and D3 disclose friction modifiers based on *ethanol- or diethanolamine* and *oleic acid*.

   D4 discloses diesters of linear or branched fatty acids and THAM as lubricant base or additive for use in turbojet *engines* without a teaching of a *dispersant*.

D5 discloses oxazolines and imidazolines having two linear or branched hydrocarbyl groups in *metal working* oils, but *dispersants* are not disclosed.

D6 refers to a dispersant/detergent additive consisting of the reaction product of alkenyl succinic anhydride and various alkanolamines in variable molar ratios; although there is no requirement that the alkenyl groups should be branched this appears to be encompassed, since e.g. polybutene is used. However, the function of the products is as *dispersant* and thus the presently claimed subject-matter is different since the required dispersant (b) cannot be the same (claims 1 to 11) and when not required, the use is different (claims 12 to 14).

The subject-matter of the claims is thus novel over documents D2 to D6.

4. Inventive step (Article 33(3) PCT)

The closest prior art is represented by US-A-5 750 476 (cited in the application) which refers to power transmitting fluids and discloses branched chain alkyl succinic acid and polyamine reaction products as friction modifier in combination with other essential components. There is no teaching of using a hydroxy-substituted amine instead of polyamine.

The subject-matter of the present application suggests further branched structures that are derivatives of branched chain acids and aminoalcohols. The FM compounds are considered to be alternative compounds, which have not been suggested previously for use in automatic transmissions.

The problem underlying the present invention is seen in the provision of compositions for other uses than engines, which require a high static friction with retained positive slope characteristics in the coefficient of friction vs. sliding speed curve. The application shows that a composition comprising isostearic/THAM (2:1) condensate has such behaviour in friction test. It should be noted however that no effect has been shown for claim 5, see also item 5.

Documents D4, D5 and D6 that encompass reaction products falling within the definition of the friction modifier, at most refer to lowered friction (D5), a typical requirement for engine oils and metal working oils, whereas the present application intends the opposite. The person skilled in the art would not look in

these documents in order to solve the problem posed.

The subject-matter of the present independent claims does not appear obvious in the light of the prior art and thus would meet the requirements of Article 33(3) PCT.

5. Some deficiencies (Article 6/Rule 5 PCT):

The subject-matter of claims 3 and 5 appears to be in contradiction with claim 1 therefore not meeting the requirements of Article 6 PCT. Claim 1 requires that the friction modifier consists of the reaction product with two branched alkyl groups, whereas claim 3 allows a molar ratio that is as low as 1.2:1 which cannot possibly be equivalent with at least two branched alkyl chains in all the reaction products. Claim 5 requires a mixture of octadecylsuccinic acid and isostearic acid, whereas it is not clear whether the octadecylsuccinic acid represents a branched alkyl carboxylic acid since nowhere stated in the description.

The word 'about' preceding ranges (open or closed) creates ambiguity, cf. claims 1, 3, 6, 9, 12 and 14 (Article 6 PCT).

The statement in the description on pages 19 and 20 implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them.

The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT and contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1, D3 and D6 is not mentioned in the description, nor are these documents identified therein.

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What is claimed is:

1. A fluid composition, comprising:

(a) a friction modifier consisting of the reaction product of a carboxylic acid or a reactive equivalent thereof with an aminoalcohol selected from the group consisting of tris-hydroxymethylaminomethane, 2-amino-2-ethyl-1,3-propanediol, 3-amino-1-propanol, 2-amino-1-propanol, 1-amino-2-propanol, 2-amino-2-methyl-1-propanol, 4-amino-1-butanol, 5-amino-1-pentanol, 2-amino-1-pentanol, 2-amino-1,2-propanediol, 2-amino-1,3-propanediol, 2-amino-2-methyl-1,3-propanediol, N-(2-hydroxyethyl)ethylenediamine, N,N-bis(2-hydroxyethyl)ethylenediamine, 1,3-diamino-2-hydroxypropane, N-N'-bis-(2-hydroxyethyl)ethylenediamine, and 1-aminopropyl-3-diisopropanol amine, wherein the friction modifier contains at least two branched chain alkyl groups, each containing at least about 6 carbon atoms; and

(b) a dispersant other than a species of (a).

2. The composition of claim 1 wherein the aminoalcohol is trishydroxymethylaminomethane.

3. The composition of claim 1 wherein the carboxylic acid and the aminoalcohol are reacted in a mole ratio of about 1.2:1 to 3:1.

4. The composition of claim 1 wherein the carboxylic acid is isostearic acid.

5. The composition of claim 1 wherein the carboxylic acid component comprises a mixture of isostearic acid and octadecylsuccinic acid or –anhydride.

6. The composition of claim 1 wherein each of the two alkyl groups contains at least about 8 carbon atoms.

7. The composition of claim 1 wherein the dispersant of (b) is a carboxylic dispersant, a succinimide dispersant, an amine dispersant, or a Mannich dispersant.

8. The composition of claim 1 further comprising an oil of lubricating viscosity.

9. The composition of claim 8 wherein the amount of component (a) is about 0.2 to about 5 percent by weight of the composition and component (b) is about 1 to about 4 percent by weight of the composition.

10. The composition of claim 8 further comprising a viscosity modifier, a supplemental friction modifier, a detergent, an oxidation inhibitor, or a phosphorus compound.

11. A method for lubricating a transmission, tractor, gearbox, or bearing, comprising supplying thereto the composition of claim 1.

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12. A method for lubricating a transmission, tractor, gearbox, or bearing, comprising supplying thereto a friction modifier consisting of the reaction product of a carboxylic acid or a reactive equivalent thereof with an aminoalcohol selected from the group consisting of tris-hydroxymethylaminomethane, 2-amino-2-ethyl-1,3-propanediol, 3-amino-1-propanol, 2-amino-1-propanol, 1-amino-2-propanol, 2-amino-2-methyl-1-propanol, 4-amino-1-butanol, 5-amino-1-pentanol, 2-amino-1-pentanol, 2-amino-1,2-propanediol, 2-amino-1,3-propanediol, 2-amino-2-methyl-1,3-propanediol, N-(2-hydroxyethyl)ethylenediamine, N,N-bis(2-hydroxyethyl)ethylenediamine, 1,3-diamino-2-hydroxypropane, N-N'-bis-(2–hydroxyethyl)ethylenediamine, and 1-aminopropyl-3-diisopropanol amine, wherein the friction modifier contains at least two branched chain alkyl groups each containing at least about 6 carbon atoms.

13. The method of claim 11 or 12 wherein the composition is supplied to an automatic transmission.

14. A method for lubricating an automatic transmission, comprising supplying thereto a friction modifier derived from the reaction of a carboxylic acid or a reactive equivalent thereof with an aminoalcohol, wherein the friction modifier contains at least two branched chain alkyl groups each containing at least about 6 carbon atoms.